REMARKS

Claims 1-47 are pending. Independent claims 1, 9, 17, and 25-27 have been amended. New claims 36-47 have been added. Reexamination and reconsideration of this application are respectfully requested.

In the May 8, 2002 Office Action, the Examiner rejected claims 1-35. The Examiner rejected claims 1-35 under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,504,270 to Sethares, in view of U.S. Patent No. 5,504,270 to Bronson, et al. This rejection is respectfully traversed.

Embodiments of the present invention are directed to an apparatus for converting an input voice signal into an output voice signal according to a reference voice signal. The input voice signal includes deterministic components and residual components. An extracting means extracts only the deterministic components from the input voice signal. The deterministic components include a plurality of sinusoidal wave components. A memory means memorizes reference pitch information representative of a pitch of the reference voice signal. A modulating means modulates the frequency value coordinates of the sinusoidal wave components of the input voice signal according to the reference pitch information retrieved from the memory means. A mixing means mixes the plurality of the sinusoidal wave components having the modulated frequency value coordinates to synthesize the output voice signal, where the output voice signal has a pitch different from that of the input voice signal and is influenced by that of the reference voice signal.

In the May 8, 2002 Office Action, the Examiner rejected claims 1-35 under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,504,270 to Sethares, in view of

U.S. Patent No. 5,504,270 to Bronson et al. The Examiner stated that Sethares teaches an analyzer device that: (a) analyzes components in the input voice signal; (b) performs a Fast Fourier Transform (FFT) analysis; (c) derives a parameter set of an original frequency and an original amplitude; and (d) has sinusoidal wave components and frequency and amplitude coordinates. The Examiner also stated that Bronson, et al. discloses a signal processing method used in generating synthetic signals that performs an FFT for fixed time periods, or frames, and determines the frequencies and amplitudes by peak-picking.

Independent claim 1, as amended, recites: "[a]n apparatus for converting an input voice signal into an output voice signal according to a reference voice signal, the apparatus comprising: extracting means for *extracting only* ***deterministic components*** *from the input voice signal, the deterministic components including a plurality of sinusoidal wave components, wherein the input voice signal includes the deterministic components and residual components*; memory means for memorizing reference pitch information representative of a pitch of the reference voice signal; modulating means for modulating the frequency value coordinates of the sinusoidal wave components of the input voice signal according to the reference pitch information retrieved from the memory means; and mixing means for mixing the plurality of the sinusoidal wave components having the modulated frequency value coordinates to synthesize the output voice signal having a pitch different from that of the input voice signal and influenced by that of the reference voice signal." (Emphasis added.)

Sethares teaches a method for receiving an electronic audio input signal having at least one partial, or overtone, evaluating the dissonance of the input signal relative

to a set of reference partials, and for producing an output signal having a larger or smaller dissonance than the input signal. (Col. 2, lines 12-17.) Sethares discloses using a "real time analyzer to calculate the spectrum of partials of [a] signal using FFT". (Col. 5, lines 25-28.) The input signal can then be altered by shifting "one or more of the input partials so that they have more desirable dissonance characteristics." (Col. 7, lines 13-16.) Sethares also discloses, in FIG. 4B, passing an analog input signal through a series of bandpass filters 18 having differing pass-through frequencies, into a microprocessor 20 which carries out a dissonance reduction calculation, through oscillators to produce the output partial, and into an accumulator 24, which produces an output signal. [Col. 9, line 57 – col. 10, line 5.]

Bronson, et al. discloses a digital speech analyzer and speech synthesizer. Bronson, et al. teaches receiving analog speech signals, sampling the signals and forming frames of the samples. The digital speech analyzer determines whether a frame is a "voiced frame" containing a fundamental frequency, or an "unvoiced frame" which does not contain the fundamental frequency. The synthesizer processes frames differently if they are voiced as opposed to being unvoiced. Bronson discloses an embodiment where noise or multipulse excitation is applied to an unvoiced frame, and the voiced frame is processed to determine its harmonic frequencies so that its pitch can be adjusted. [Col. 5, lines 19-24; col. 7, line 65 – col. 8, line 11.]

However, neither Sethares nor Bronson, et al., alone or in combination disclose, teach, or suggest extracting only *deterministic components* from the input voice signal, *the deterministic components including a plurality of sinusoidal wave components,* where the input voice signal includes the deterministic components and residual

components. Independent claim 1, as amended, recites limitations for extracting deterministic components, but not the residual components, from the input voice signal, and modulating means to modulate the frequency value coordinates of the sinusoidal wave components. Accordingly, only the sinusoidal wave components of the deterministic components, <u>not</u> the residual components, are modulated. Bronson, et al. discloses determining harmonic peaks of a voiced frame, but not of an unvoiced frame. Therefore, Bronson, et al. teaches an "all or nothing" approach to determining the harmonics – either harmonics for an entire frame are determined (i.e., if the frame is voiced), or the harmonics are not determined for the frame (i.e., if the frame is unvoiced). Sethares also does not disclose extracting only deterministic components from an input voice signal having deterministic components and residual components.

Thus, applicants submit that independent claim 1, as amended, distinguishes over Sethares and Bronson, et al., alone or in combination. Claims 2-8, 30, and 36-37 all depend, directly, or indirectly from independent claim 1, as amended. Independent claims 9, 17, and 25-27, each as amended, each contain limitations similar to those in independent claim 1, as amended. Claims 10-16, 31, and 38-39 all depend, directly or indirectly, from independent claim 9, as amended. Claims 18-24, 28, 32, and 40-41 all depend, directly or indirectly, from independent claim 17, as amended. Claims 33 and 42-43 directly depend from independent claim 25, as amended. Claims 34 and 44-45 directly depend from independent claim 26, as amended. Claims 29, 35, and 46-47 directly depend from independent claim 27, as amended. Therefore, it is respectfully submitted that the rejection of claims 1-3, 5-6, 9-13, 17-21, and 25-35 under 35 U.S.C. §103(a) should be withdrawn.

Applicants believe that the foregoing amendments place the application in condition for allowance, and a favorable action is respectfully requested. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call either of the undersigned attorneys at the Los Angeles telephone number (213) 488-7100 to discuss the steps necessary for placing the application in condition for allowance should the Examiner believe that such a telephone conference would advance prosecution of the application.

Respectfully submitted,

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